

A 9-year-old male black rhinoceros (*Diceros bicornis*), weighing about 2,500 lb, exhibited a slight tenderness of the front feet. There was excessive tissue growth in the interdigital space between the second (medial) and third (central) digits on both front feet. The animal was kept under close observation to assess the severity of the condition.

Subsequently, lameness became more exaggerated and the tenderness more pronounced. Thus, the decision was made to immobilize the animal and surgically remove tissue masses from the interdigital spaces.

Surgical Procedure

The animal was given 2 mg of etorphine hydrochloride (M-99—American Cyanamid) and 25 mg Acepromazine (Ayerst) intramuscularly via a projectile syringe fired from a carbon dioxide-powered pistol (*Figure 1*).

After four to six minutes, the rhinoceros started circling. Twelve minutes later came the classic "goose-step", an exaggerated lifting and placing of the forelegs. Twenty minutes after injection the animal was forcibly pulled into lateral recumbency before it reached the excitable stage (*Figure 2*). Lateral recumbency was maintained throughout the procedure.

A papilloma measuring 15 cm x 10 cm x 8 cm was removed from the left front foot, and a papilloma 5 cm x 5 cm x 3 cm was removed from the right front foot (*Figures 3 & 4*). Each mass was removed by curettage, hemorrhage being controlled by electrocautery. Copper naphthenate (Koppertox®—Ayerst) was then applied topically and antibiotics were given parenterally. Temporary bandages were applied.

After completion of the procedure, 4 mg of the antagonist diprenorphine (M50-50—American Cyanamid) were given in the auricular vein and 4 mg were given intramuscularly. The animal was on its feet and walking two minutes after the diprenorphine was administered (*Figure 5*).

(Continued on next page)

Interdigital Corns in a Black Rhinoceros

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Figure 1—Black rhinoceros two minutes after M-99 was injected by means of a projectile syringe.

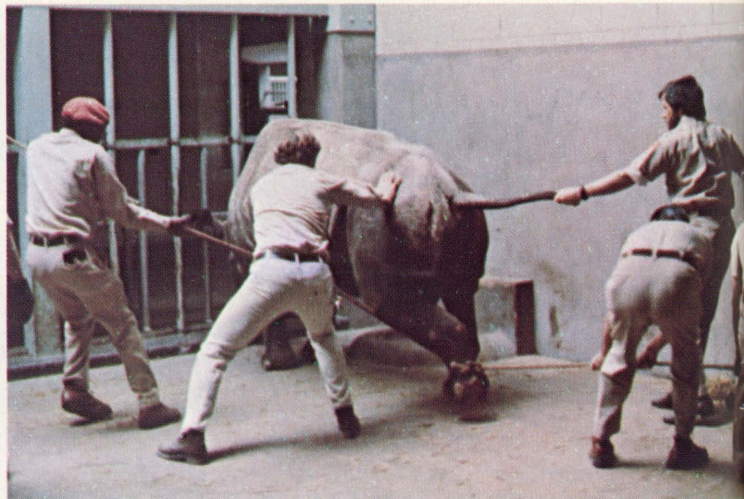


Figure 2—The sedated rhinoceros is pulled into lateral recumbency.

INTERDIGITAL CORNS (CONT'D)

For three days the rhinoceros continued to show tenderness in both front feet and stayed off its feet more than usual. After a short recovery period, the animal walked with no visible lameness or irritation.

Discussion

Histologically, the mass had the configura-

tion of a papilloma, with the epithelial layer producing horn (*Figures 6 & 7*).

A papilloma is a benign epithelial neoplasm. Usually it grows from a stratified squamous surface.¹ Papillomas consist of numerous papillae. They have cores of fibrous connective tissue that provide the blood vessels which supply necessary nutrients.¹

Papillomas may be divided into two types, squamous and fibrous. Squamous papillomas are architecturally similar to in-

Figure 3—Normal foot of a black rhinoceros.





Figure 5—The black rhinoceros 10 minutes after intravenous injection of the antagonist M50-50.

fectious verrucae but do not exhibit the oncolytic changes of young verrucae. Their structure is due to hyperplasia of the epidermis over the dermal papillae. Hyperplasia draws the dermal connective tissue into long cores for the papillae.²

Fibrous papillomas are composed mainly of a core of mature connective tissue. They are covered by an epithelium that is moderately acanthotic. Fibrous papillomas may form small projecting nodules or be filiform as individual papillae (skin tags).

Hyperkeratinization of the papilloma occurs when the epithelial layer produces keratin.³ These projecting masses of keratin, pyramidal or conical in shape, are sometimes called cutaneous horns. The remarkable feature of cutaneous horns is the tenacity of the keratin.² Hyperkeratinized papillo-

mas have been reported to occur in cattle, sheep, goats, and primates but seldom in other species.^{2,4}

It is seldom possible to determine the cause of a papilloma. One theory is that papillomas are a result of prior injury or inflammation of the affected site. In many instances, evidence of such etiology does exist.

Another theory is that similar lesions in bulls result from overweight. A heavy, fat pad in the interdigital space swells and depresses the interdigital skin. This skin is squeezed and traumatized when the bull walks. Hyperplasia results.

These are two possible causes for the condition in the rhinoceros, although the animal was not overweight for the species and there was no known previous trauma. The rhinoceros' enclosure contained sharp rocks,



Figure 4—Papilloma measuring 15 cm x 10 cm x 8 cm situated in the interdigital space between the second (medial) and third (central) digit of the left front foot.

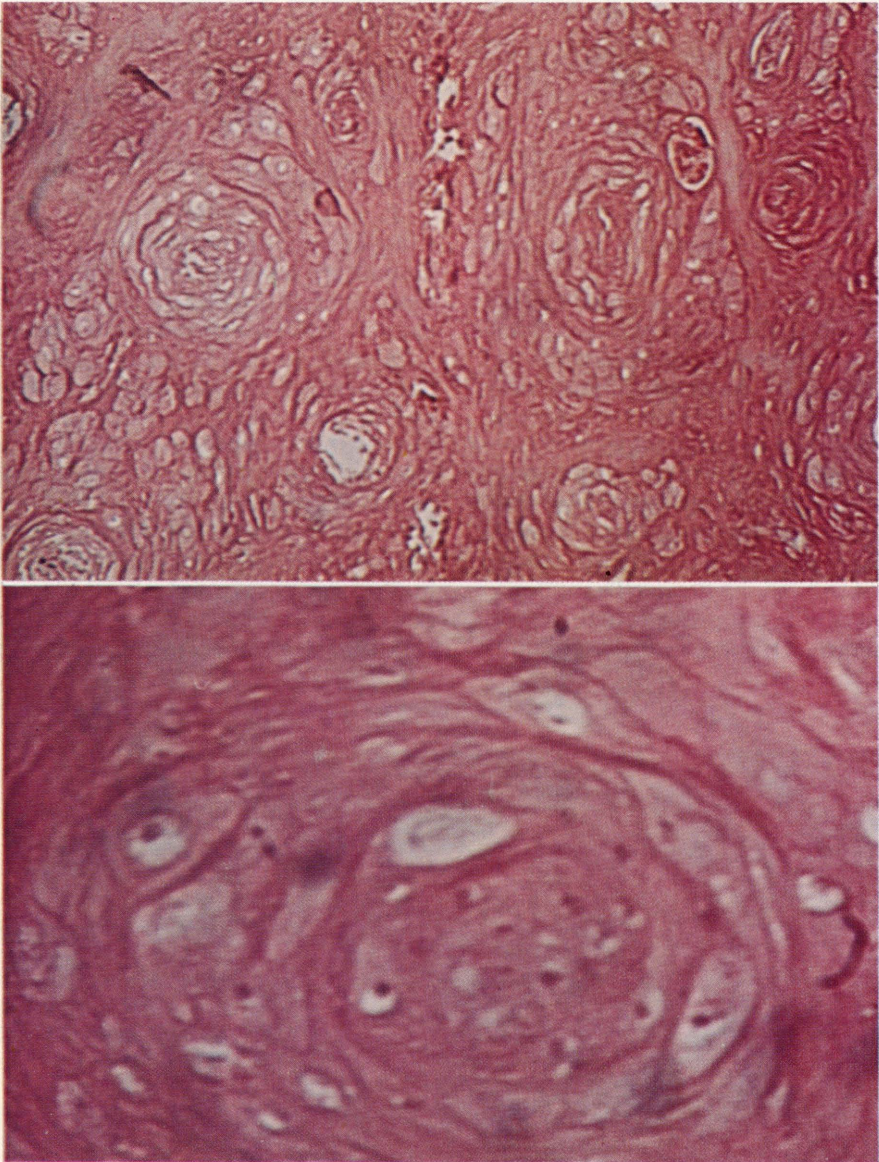
but whether these rocks caused the papillomas could not be determined.

Papillomas do recur at the same site with some regularity. More curettage was necessary 26 months later when further growth and lameness developed. The same procedure was followed and the animal was again walking well within one week. At the same

rate of recurrence, curettage may be required again in two years.

REFERENCES

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Figures 6 & 7—Histological sections of the excised mass resembling a papilloma (x100 and x400, respectively).